SERVICE MANUAL

Castle®

GLS-8
GLS-10
Steam Sterilizers

MDT BIOLOGIC COMPANY
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Technology for Life

350124 Rev. B

SERVICE MANUAL 350124 (1/12/89)
Rev. A (10/27/89) Address Changed
Rev. B (5/20/91) GLS-8 Added

Related Publications:

Operator Manual	350123
Parts Catalog	350125

DESCRIPTION OF SYMBOLS & NOTES IN MANUAL

The following symbols with related notes appear in this manual.

"Warning" notes alert the user of the manual when there is a possibility of personal injury.

"Caution" notes alert the user of the manual when there is a possibility of damage to the equipment.

"Notes" alert the user of the manual to pertinent facts and conditions.

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TECHNICAL DATA — GLS-8

Cabinet Size	13W x 16H x 22L inches (330W x 406H x 559 mm)
Chamber Size	8" diameter x 14-1/2" Usable Depth (203mm dia. x 368mm Usable Depth)
Tray Sizes	One 12" x 5-5/8" x 7/8" (304mm x 142mm x 22mm)
Weight	55 lbs. (25 kgs.)
Heater Wattage:	
Processing	750 + 750 = 1500
Drying	15% of 1500 (225)
Electrical Rating	115VAC, 50/60 Hz., 12 Amps 230VAC, 50/60 Hz., 6 Amps
Maximum Rated Operating Pressure	45 psi (310 kPa)
Reservoir Capacity	3000ml (Approx. 3 qts)

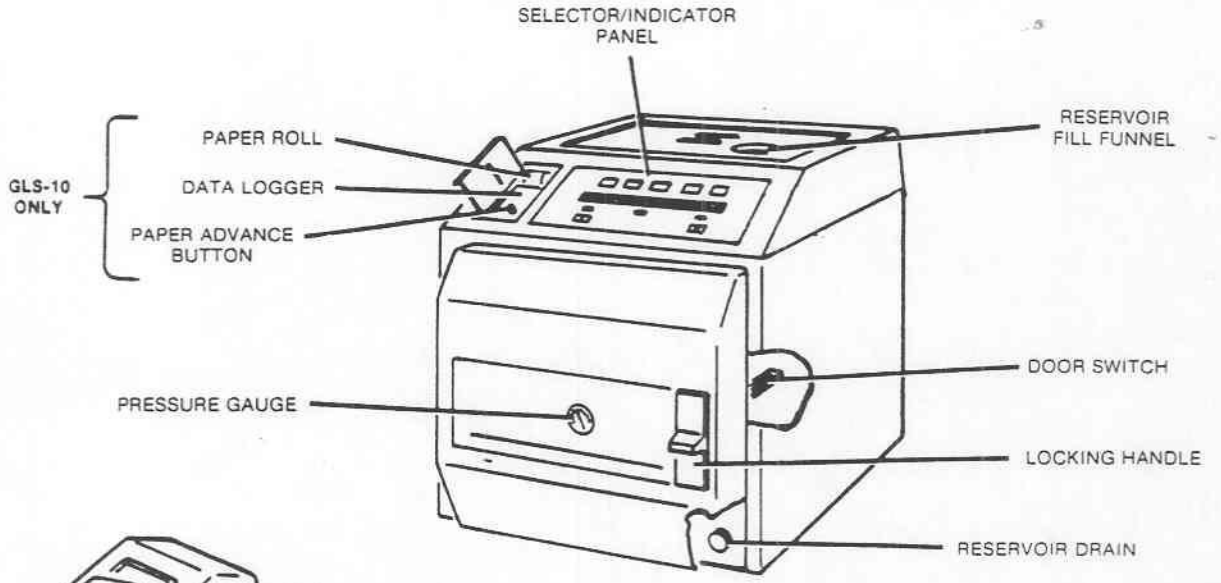
TECHNICAL DATA — GLS-10

Cabinet Size	16W x 18H x 23L inches (406W x 457H x 584 mm)
Chamber Size	10" diameter x 15-1/2" Usable Depth (254mm dia. x 393mm Usable Depth)
Tray Sizes	One 15-1/4" x 9" x 1-1/4" (387mm x 228mm x 32mm) One 14" x 6 1/4" x 7/8" (356mm x 155mm x 22mm)
Weight	70.5 lbs. (32 kgs.)
Heater Wattage:	
Processing	750 + 750 = 1500
Drying	15% of 1500 (225)
Electrical Rating	115VAC, 50/60 Hz., 12 Amps 230VAC, 50/60 Hz., 6 Amps
Maximum Rated Operating Pressure	45 psi (310 kPa)
Reservoir Capacity	4000ml (Approx. 4 qts)

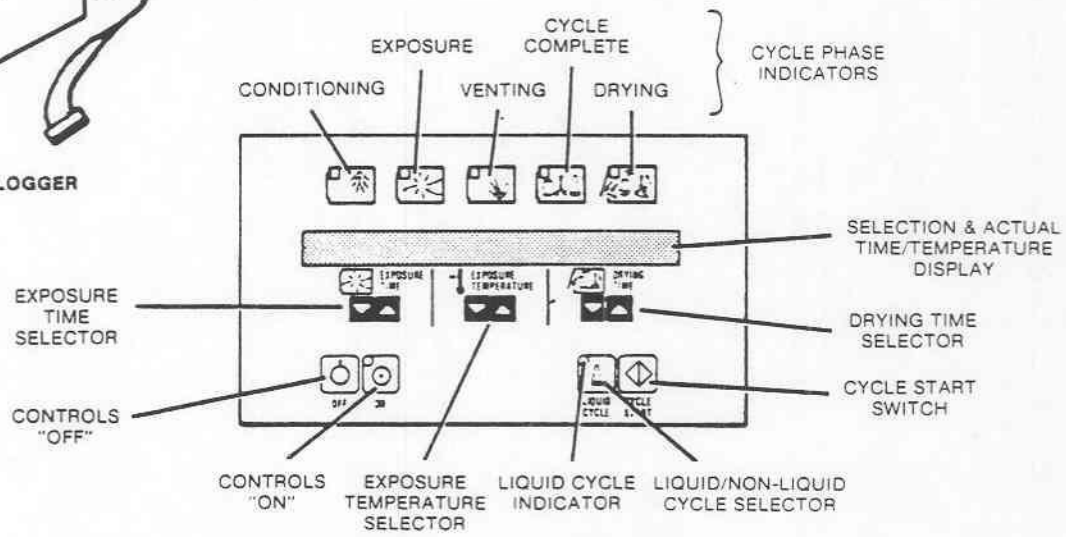
TEMPERATURE		PRESSURE	
°C	°F	PSI	kPa
121	250	15-18	103-124
135	275	30-33	207-228

STERILIZING TEMPERATURE/PRESSURE
COMPARISON CHART

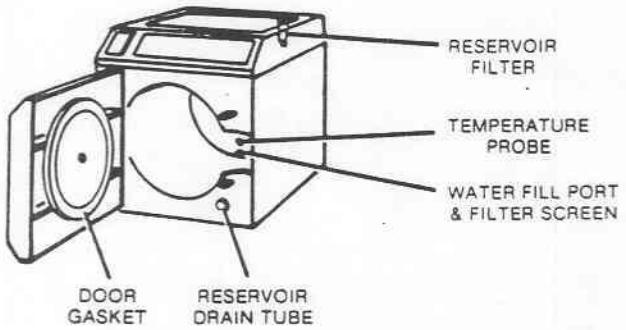
GENERAL DESCRIPTION

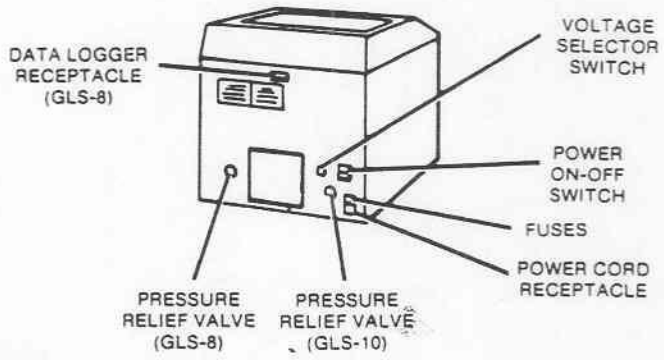


OPTIONAL DATA LOGGER
GLS-8



SELECTOR/INDICATOR PANEL





DESCRIPTIONS OF COMPONENTS

CONTROLS

MAIN POWER ON-OFF SWITCH — Turns the electrical power from the power source to the input/output printed circuit board ON or OFF.

"ON" PUSHBUTTON SWITCH — Energizes the control panel and places sterilizer in a ready mode.

"OFF" PUSHBUTTON SWITCH — Terminates any cycle in progress and turns off all electrical power to controls.

EXPOSURE TIME SELECTOR — Sets the desired time a load is to be exposed to a selected temperature. Set time will remain for successive cycles until changed.

EXPOSURE TEMPERATURE SELECTOR — Sets the desired temperature at which the load is to be processed for the selected time. Temperature setting will remain until changed.

DRYING TIME SELECTOR — Sets desired time a load is to be exposed to the low drying heat. There is no temperature selection for drying phase.

LIQUID CYCLE — When pressed and indicator light is on, the liquid cycle has been selected. Pressing the liquid cycle switch again will deactivate the liquid cycle. Indicator light will go out.

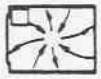
CYCLE START — Actuates the selected processing cycle (sterilize or drying).

STERILIZER DOOR — Hinging on the left side, the door retains a silicone rubber gasket which seals the door to the chamber thus permitting pressure to build up in the chamber.

DOOR HANDLE — The handle slides downward to lock the door closure tightly against the chamber opening. When moved upward from the locked position, the locking and sealing action of the door is released and the door can be opened. The door handle cannot be moved when there is pressure in the chamber.

CYCLE PHASE INDICATOR

CONDITIONING — Water entering chamber and chamber heating to selected exposure temperature.

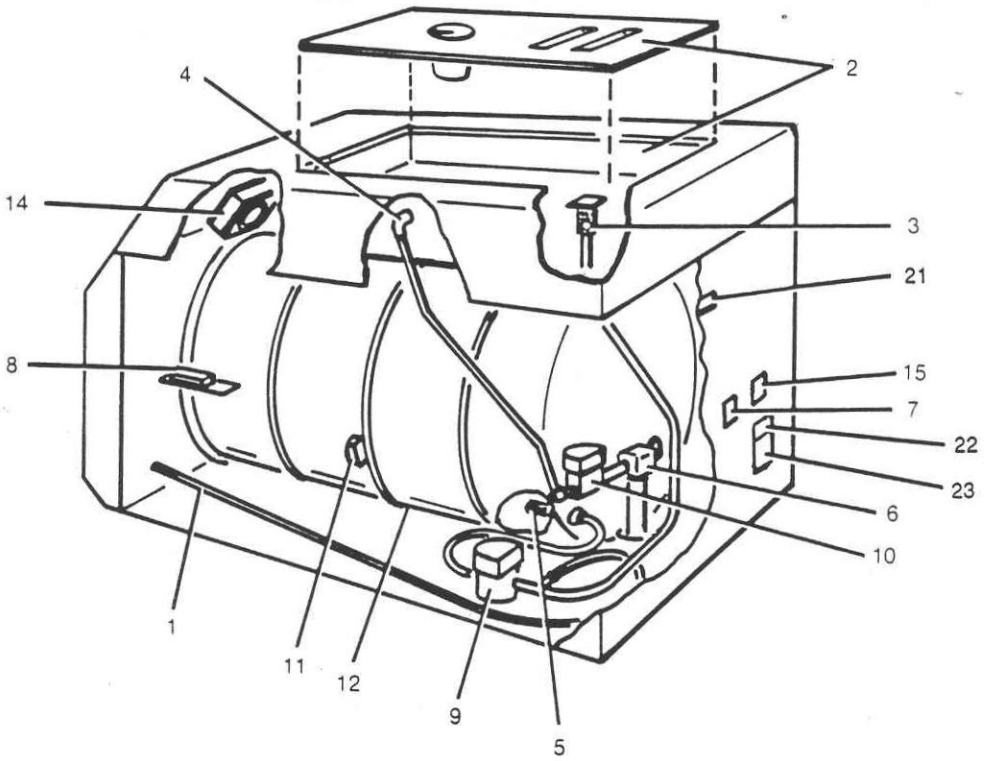


EXPOSURE — Steam processing load at selected time and temperature.

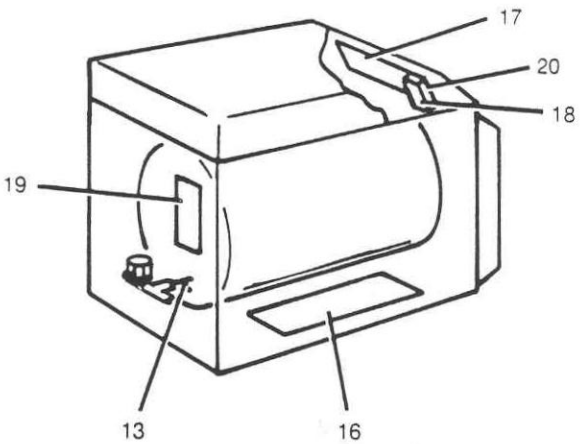
VENTING — Steam and water being removed from the chamber.

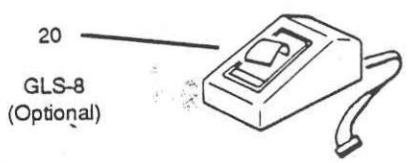
COMPLETE — Processing is complete.

DRYING — Drying phase is in progress.



1. Reservoir Drain Tube
2. Reservoir (with Cover)
3. Reservoir Filter
4. Chamber Vent Port
5. Chamber Filter Screen
6. Pressure Relief Valve
7. Voltage Selector Switch
8. Door Switch
9. Fill/Drain Solenoid Valve
10. Vent Solenoid Valve
11. Overheat (Low Water) Cut-Off
12. Heater
13. Temperature Probe
14. Cooling Fan
15. Main Power On-Off Switch
16. Input/Output P.C. Board
17. Control P.C. Board
18. Data Logger P.C. Board (GLS-10)
19. Power Supply
20. Data Logger Printer
21. Data Logger Printer Receptacle (GLS-8)
22. Fuse Capsule
23. Power Cord Receptacle





PIPING COMPONENTS

RESERVOIR DRAIN TUBE (1) — Pulls out and cap is unscrewed to allow water to be drained from the reservoir.

RESERVOIR (2) — The water reservoir holds the 4000ml (4 qts) of distilled or deionized water supply used to create the steam in the chamber.

RESERVOIR FILTER (3) — Water from the reservoir flows through the filter to the chamber. When the chamber is vented, water and steam return to the reservoir through the filter in the opposite direction. The filter is threaded into a fitting in the reservoir. A splash baffle is attached to the top of the filter to prevent water from blowing out under the reservoir cover during venting.

CHAMBER VENT PORT (4) — Provides an air vent from the chamber into the reservoir.

CHAMBER FILTER SCREEN (5) — Water from the reservoir flows through the filter screen each time a sterilizer cycle is run. Steam and water returns to the reservoir through the filter screen in the opposite direction. The filter screen slides into the water port at the rear of the chamber.

PRESSURE RELIEF VALVE (6) — The pressure relief valve opens at 45 psi (310 kPa) to protect the vessel (chamber) from exceeding the rated pressure. Steam from the relief valve is directed downward through a vent tube in the bottom of the sterilizer.

PRESSURE GAUGE — Indicates the pressure in the chamber during a sterilize cycle. Pressure is indicated in pounds per square inch (0-60 psi) and kilo pascals (0-400 kPa).

ELECTRICAL COMPONENTS

VOLTAGE SELECTOR SWITCH (7) — Located on the back of the sterilizer, this switch was pre-set at the factory.

This switch MUST be positioned to match the supply source BEFORE the unit is connected to the power source. Damage to electronic components could occur if switch is not set for proper voltage.

DOOR SWITCH (8) — The door switch prevents a sterilizer cycle from functioning if the door is not fully latched. The electric control circuit for sterilization heating is interrupted when not grounded through the door and the door switch.

POWER SUPPLY (19) — The Power Supply P.C. Board is attached to the inside back panel of the sterilizer cabinet. The power supply PCB converts incoming AC line voltage to varied low DC voltage for operation of the microprocessing control system. The power supply is adjustable.

FILL/DRAIN SOLENOID VALVE (9) — This valve is normally closed. The valve opens for approximately 42-45 seconds when a sterilize cycle is activated to allow approximately 360 ml of water to enter the chamber. At the completion of the cycle the valve opens again to permit steam and water to be exhausted from the chamber into the reservoir.

VENT SOLENOID VALVE (10) — Normally closed the vent solenoid opens when the controls are turned on. The valve will stay on for approximately 3 minutes into the sterilize cycle to allow air to be displaced from the chamber. During the sterilize cycle, the vent solenoid valve closes to maintain chamber pressure. At the completion of the cycle the valve opens again, and will remain open as long as the controls are activated.

OVERHEAT (LOW WATER) CUT-OFF SWITCH (11) — Clamped to the outside of the chamber, the overheat cut-off switch opens the heating circuit when the chamber walls gets too hot, and possibly damaging the chamber. Chamber overheat is generally caused by inadequate water in the chamber. The overheat cut-off switch automatically resets when chamber and switch cool to a safe level. Then the unit must be turned off and then on to restart the cycle.

HEATER (12) — The heater is a dual element (1500.W) unit. The heater is clamped against the bottom of the chamber with three steel bands and a metal back up plate. Full heater wattage is used to generate steam for a sterilize cycle. Approximately 25% of the total heater wattage is utilized for drying cycle by pulsing the heater on/off.

FUSE CAPSULE (22) — Two fuses are contained in a fuse capsule located in the power cord receptacle at the rear of the unit.

TEMPERATURE PROBE (13) — Located in the back wall of the chamber the temperature probe senses the temperature inside the chamber. The temperature sensed by the probe is processed by the microcomputer to turn the heater on and off to maintain chamber temperature within +3°C, -0°C of the set temperature.

COOLING FAN (14) — The cooling fan is provided to cool the components on the Control PC Board. The fan is attached to the heat shield on the underside of the control PC board. The fan runs continuously when the main power switch, on the back of the unit, is ON.

CONTROL PRINTED CIRCUIT BOARD — The Control PCB is located on the underside of the Selector/Indicator Panel, inside the top cover. The Control PCB is the brain of the GLS system governing the functions of the selective cycles.

The Control PCB contains the microprocessor, memory, analog circuitry with A to D converter for temperature control. A selector/indicator display interface circuitry, on the board, includes exposure time, exposure temperature and drying time digital readout display modules. LED's to illuminate the Controls ON, Liquid cycle selection and the five Cycle Phase Indication are also a part of the Control PCB.

INPUT/OUTPUT (I/O) PRINTED CIRCUIT BOARD — Located on the base plate at the left side of the chamber, the I/O PCB interfaces the control components (i.e., solenoid valve) to the microprocessor. The temperature probe, door switch and overheat switch signals are fed through the I/O PCB to the Control PCB. The Control PCB using this information controls the solenoids, heaters and overheat relay and alarm through the I/O PCB therefore controlling the GLS. LED check indicators to aid trouble diagnosis are in the output circuit of the I/O PCB.

DATA LOGGER (20) — The Data Logger is a solid state printer that provides a paper tape record for future reference. Included on the record of each cycle are the cycle number, selected time and temperature settings, and actual temperature readouts at one minute intervals. Also printed on the tape, at time of occurrence, are when cycle begins the exposure phase, the venting phase, and cycle complete. Conditional conditions of premature cycle abort and chamber overheat situations are also recorded. An analog graph showing temperature variation from an undertemp condition to maximum selected temperature within the range of the unit.

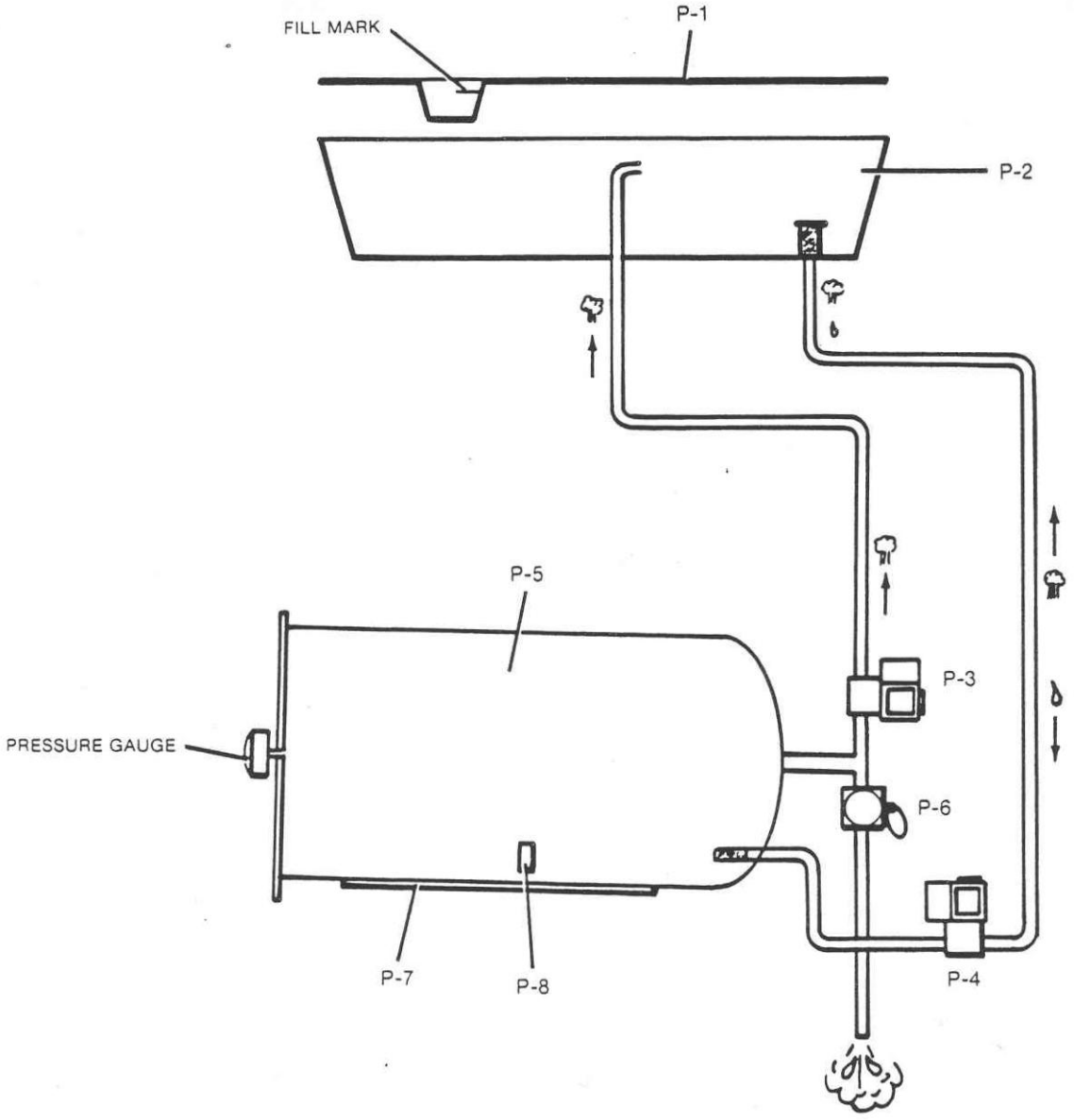
The Data Logger printer operates from electronic impulses on special paper and requires no ribbon and therefore no ribbon changing.

The Data Logger printer on the GLS-10 model sterilizer is an integral part of the control panel. On the GLS-8 model, the optional data logger printer is a separate free-standing unit connected to the sterilizer through a plug-in cable.

PAGE

STEAM GENERATION DIAGRAM 2-2

SEQUENCE OF OPERATION 2-3



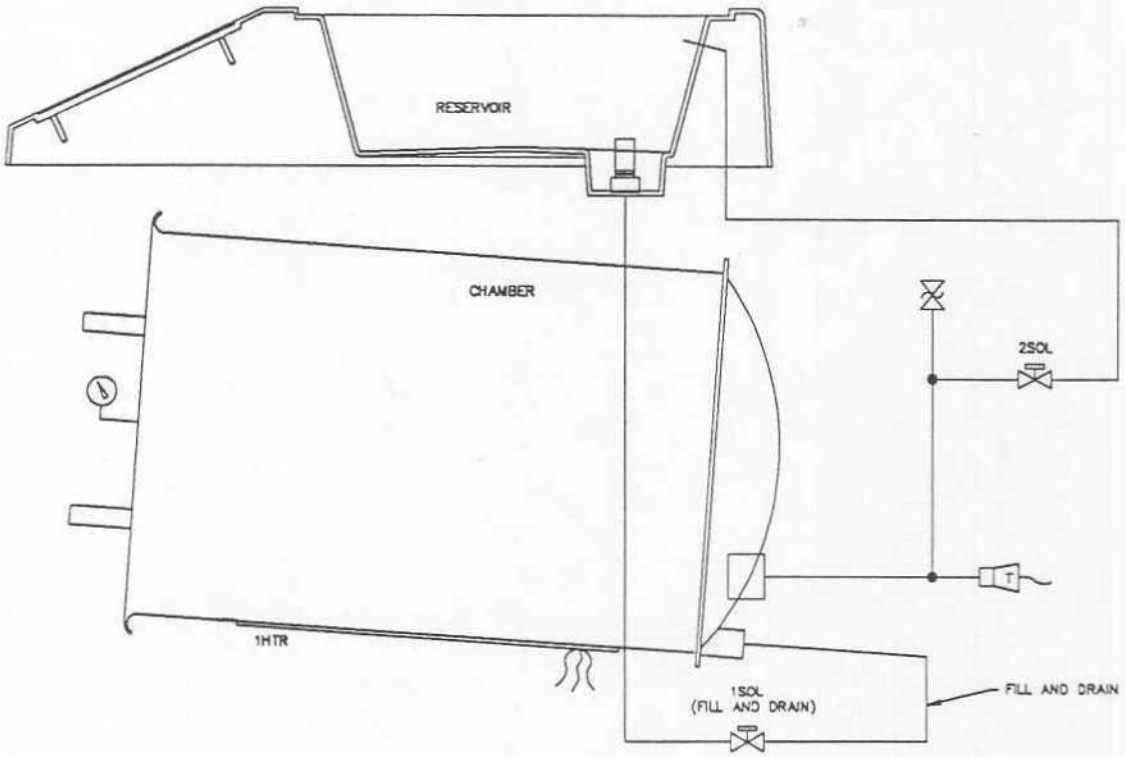
STEAM GENERATION DIAGRAM

P-1	RESERVOIR COVER
P-2	RESERVOIR
P-3	VENT SOLENOID VALVE
P-4	FILL/DRAIN SOLENOID VALVE
P-5	CHAMBER
P-6	PRESSURE RELIEF (SAFETY) VALVE
P-7	HEATER
P-8	OVERHEAT CUT-OFF SWITCH

SEQUENCE OF OPERATION

CYCLE STATUS	STARTING ACTION	CYCLE FUNCTIONS
Power On	Main Switch ON	Power Supply PCB energized. Cooling Fan ON.
Controls OFF Door open	Fill Reservoir	Fill reservoir (**P-2**), with distilled or deionzed water to fill mark in Cover (**P-1**).
Controls ON	Turn Controls ON. Door open or closed	Control Panel energized, digital display ON. Vent Solenoid Valve (**P-3**) energized (opened).
Conditioning Phase	Door closed. Cycle start. Chamber filling.	On models with Data Logger, Data Logger printer begins to record cycle data. The Fill/Drain Solenoid Valve (**P-4**) energizes (opens), water drains from reservoir (**P-2**) into chamber (**P-5**). Heater (**P-7**) is energized to begin heating chamber. After approximately 45 seconds, Fill/Drain Solenoid Valve (**P-4**) de-energizes (closes).
Air Removal		Chamber continues to heat, producing steam, expelling air thru open vent valve (**P-3**) and raising chamber temperature. Approximately two (2) minutes after chamber reaches 98°C, Vent Solenoid Valve is de-energized (closed) allowing pressure in chamber (**P-5**) to increase until set temperature is reached.
Exposure	Set Temperature reached.	Heater is energized and de-energized to maintain set temperature for set time duration.
Venting (dry goods) Venting (liquids)	Set Exposure time expires.	Heater (**P-7**) is de-energized. Fill/Drain Solenoid Valve (**P-4**) is energized (opened), allowing steam and water to exhaust thru solenoid into reservoir (**P-2**). Heater (**P-7**) is de-energized. Fill/Drain Solenoid Valve (**P-4**) is energized and de-energized intermittently to produce a gradual venting (approximately 2.5 psi per minute), until 102°C is reached.
Cycle Complete	Venting Complete	At 102°C, the Fill/Drain Solenoid Valve (**P-4**) is de-energized to prevent water from draining into chamber. Vent Solenoid Valve (**P-3**) is energized (opened) to remain open until Controls are turned off or another cycle is activated. Audible tone will sound for approximately 3 seconds.
Emergency Over-Pressure of Chamber	Chamber pressure exceeds 45 psi (310 kPa)	Pressure Relief Valve (**P-6**) opens releasing excess pressure thru vent tubing in bottom plate.
Overheat	Temperature of Chamber excessive	Low Water Cut-Off Switch (**P-8**) opens. All valves remain closed, electrical power to heater is turned OFF. Control Panel stays ON. OH appears on display.

FLOW DIAGRAM



SAFETY VALVE

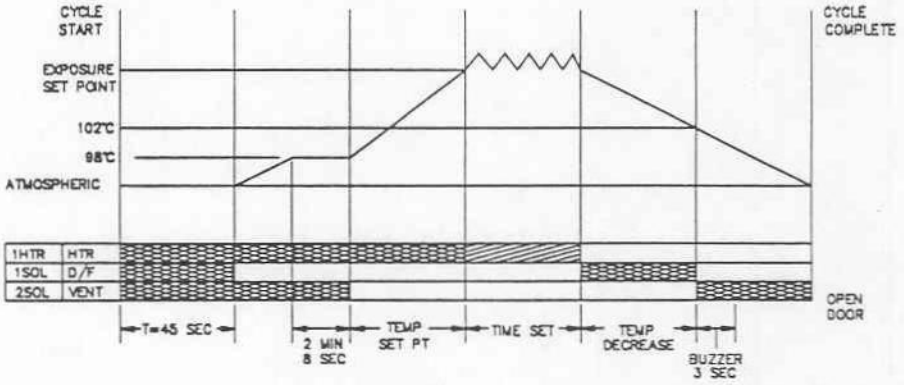
TRANSDUCER, TEMPERATURE

SOLENOID VALVE

HEATER

GAUGE

FILTER, WATER

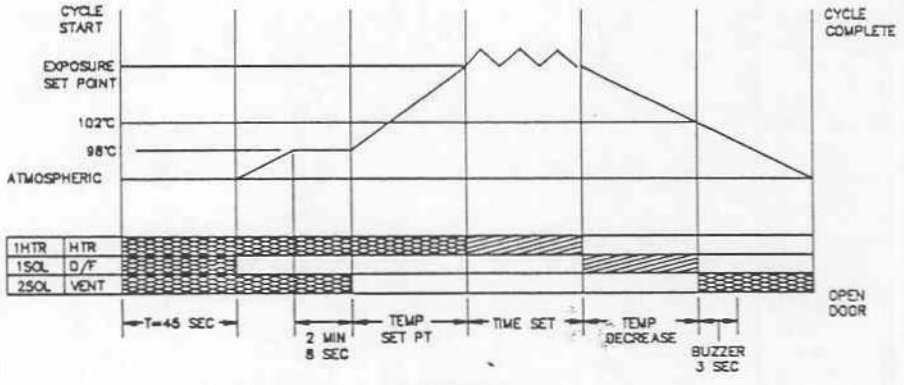


DRY GOODS

CONTROLLED

ENERGIZED

DE-ENERGIZED



LIQUIDS CYCLE

P1744C

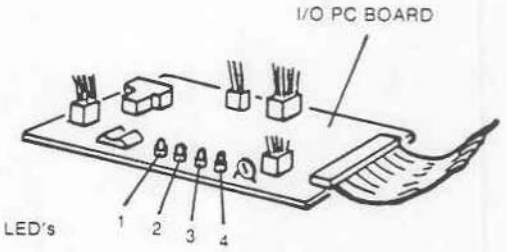
TROUBLESHOOTING CHARTS

NOTE

Four LED's (Light Emitting Diodes), located on the Input/Output PC Board, light to indicate a signal is being transmitted from the microprocessor to a major component. If an LED is lit, but the corresponding component does not function, the problem is at the component. If the LED does not light at the designated time, a malfunction of the control PC Board or the Input/Output PC Board can be suspected.

LED number component designation

LED #1 — Overheat Relay
LED #2 — Heating Element
LED #3 — Vent Solenoid Valve
LED #4 — Fill/Drain Solenoid Valve



PROBLEM	POSSIBLE CAUSE	REMEDY
Cycle Ends Prematurely. (OH Appears on Display Panel).	1. Insufficient water in chamber (see page 4-5).	
	a) Air lock in fill tubing.	1a) Double Fill Chamber after reservoir has been drained and refilled (see Operators Manual — inform operator of procedure).
	b) Reservoir empty or low on water.	b) Fill reservoir to "FILL" mark in fill funnel.
	c) Reservoir Filter or Chamber Screen clogged.	c) Clean Reservoir Filter and/or Chamber Screen. (Refer to filter and screen cleaning procedure in Adjustment and Repair Section).
	d) Sterilizer not level.	d) Be sure sterilizer is setting on a level surface. Unlevel surface will provide poor distribution of water in chamber, causing Overheat.
	e) Fill/Drain Solenoid Valve not opening.	e) If LED #4 is lit for approximately 45 seconds after "CYCLE START" has been pressed, insufficient water enters the chamber after filters and tubings have been checked for restrictions, the Fill/Drain Solenoid Valve could be defective. • Check operation of Solenoid Coil. (Refer to Adjustment & Repair Section). • Sluggish valve operation or excessive leakage indicates cleaning required. If internal parts are corroded or rubber seats are spongy or crusted, rebuild or replace valve.

TROUBLESHOOTING CHARTS (Cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
Cycle Ends Prematurely. (OH Appears on Display Panel). (Continued)	f) Overheat Switch defective.	f) After extended cooling period (30 minutes) turn controls OFF and ON. If OH indication remains on display, the overheat switch is probably defective. To check, turn OFF power, remove switch from bracket and check continuity thru switch. No reading, replace switch. (**NOTE**: switch will automatically reset when cooled sufficiently.
	g) Control PC Board defective.	g) If LEDS #3 & 4 do not light when Cycle Start is pressed, Control PC Board is defective — replace Control PC Board.
	h) Input/Output PC Board defective.	h) LEDS #3 & 4 light when Cycle Start is pressed — replace I/O PC Board.
	i) Vent Solenoid Valve not opening. (Back pressure in chamber, prevents fill).	i) LED #3 ON - check Solenoid Valve. LED #3 not ON - check I/O PC Board and/or Control PC Board.
Cycle Ends Prematurely. (Display Panel Blank).	1. Power Source Failure	1. • Check electrical supply at source — restore. • Be sure Main Switch on back of unit is on.
	2. Microprocessor Malfunction.	2. Voltage surge causing microprocessor to shut down, turn Main Switch on back of unit OFF, then ON to reset microprocessor.
	3. Fuse Blown.	3. Remove left side (facing unit) panel and replace fuse on I/O PC Board.
Control Panel Display will not light.	1. Main Switch OFF.	1. Turn Main Switch on back of Sterilizer ON.
	2. Power Failure.	2. Restore Power.
	3. Fuse Blown.	3a. Check the fuses in the capsule on back of cabinet. 3b. Remove left side (facing unit) panel and replace fuse on I/O Board.
	4. Power Supply PC Board.	4. Be sure Voltage Selector Switch is positioned for the proper supply voltage. If Voltage Selector Switch is set at 115V and power source is 230V, the **Power Supply PC Board will be damaged.** To check the Power Supply

Continued . . .

TROUBLESHOOTING CHARTS (Cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
Control Panel Display will not light. (Continued)		PC board Set voltmeter for 20VDC range. Check voltages at pins on connector J9 on I/O PC board. Pin Nos. Voltage 5 & 1 = 12 VDC 5 & 2 = 5 VDC 5 & 3 = 5 VDC 5 & 4 = 0 Volts (Minimum voltage reading)
Will not go into Sterilization Heating Mode.	1. Door not fully latched. 2. a) Heater Malfunction b) I/O P.C. Board 3. Low output from Power Supply PC board. 4. Control PC Board	1. Close and Latch Door completely. 2. a) LEDS #1 & 2 ON, Extended time to heat chamber to exposure temperature. Check heater circuit, (see Heater Continuity Test, page 4-4). b) LEDS #1 & 2 ON - Extended time to exposure temperature — check for line voltage at J4 & J5 on I/O PC Board. 3. Check the D.C. voltage reading between pins 5 & 2 and 5 & 3 at J9 on the I.O. PC board. Voltage reading at both test points should be 5 VDC to 5.2 VDC. To increase, turn potentiometer (R-18) clockwise. (see Adjustment & Repair Section). 4. No Light on LEDs #1 and/or #2 when CYCLE START is pressed indicates no signal to I/O PC board and heater. Replace Control PC Board.
No Pressure or Low Pressure in Chamber After 30 Minutes.	1. Door Gasket not sealing. 2. Solenoid Valve open. 3. Heater Malfunction.	1. Clean or replace door gasket. 2. • If chamber is over filled with water (water runs out of chamber when door is opened), Fill/Drain Solenoid Valve sticking open. Clean or replace internal parts of valve. • Gurgling or steam escaping from vent port in side of reservoir, and chamber temperature will not go above 100°C, indicates that the Vent Solenoid Valve is not closing. Clean or replace internal parts of valve. 3. See "Will not go into Sterilization Heating Mode" Continued . . .

TROUBLESHOOTING CHARTS (Cont'd.)

PROBLEM	POSSIBLE CAUSE	REMEDY
No Pressure or Low Pressure in Chamber After 30 Minutes. (Continued)	4. Gauge defective.	4. If display and/or data logger tape indicate proper selected temperature and sterilization monitor shows a sterile load at completion, REPLACE PRESSURE GAUGE.
Load does not dry.	1. Wet Load In.	1. If Load is excessively wet when placed in sterilizer, the load will be wet when removed. Heaters will not dry wet loads.
	2. Heater not ON.	2. Actuate dry cycle, if LED #1 is "ON" and #2 flashes rapidly, check heater circuit, (see "HEATER CONTINUITY TEST", below).
	3. Controls PC Board.	3. If LED #1 & 2 do not light, Control or I/O PC Board is defective. Replace.
Data Logger Does Not Print.	1. Paper Improperly Installed.	1. Paper installed upside down, refer to Operators Manual.
	2. Printer Head Jammed.	2. Carefully remove paper and any torn pieces, re-feed paper into printer.
	3. Printer Head defective.	3. Replace data logger printer.
	4. Data Logger PC Board.	4. Replace.
Will Not Advance to Exposure Phase.	1. Heater Malfunction.	1. LEDs #1 & 2 ON. Check heater circuit, (see "HEATER CONTINUITY TEST", below).
	2. Control PC Board.	2. LEDs #1 & 2 do not light when cycle start is pressed. Control or I/O PC Board defective. Check Control PC Board calibration (page 5-2).
	3. Temperature Probe.	3. Temperature Probe open circuit. Turn off power, disconnect connector from J7 Temperature Sensor on I/O PC Board. Check continuity thru probe leads.

HEATER CONTINUITY TEST

The following procedure can be used to check the continuity of the elements in the heater without disconnecting leads.

1. Disconnect the electrical power to the sterilizer and turn off the Main Switch on the back of the sterilizer.
2. Check the resistance (ohms) reading between J4 & J5 on the I/O PC Board.

For units with Voltage Selector Switch set for 115 Volts the reading should be approximately 9 ohms. For units set for 230 Volts the reading should be approximately 36 ohms.

A reading other than specified indicates a defective heater, Voltage Selector Switch or faulty wiring in the heater circuit.

TO CHECK WATER LEVEL IN CHAMBER

To check for the proper amount of water in the chamber, the Sterilizer MUST BE LEVEL.

1. Open the Sterilizer door and remove trays and rack.
2. Be sure there is no water in the chamber.
3. Close door.
4. Press Cycle Start and wait approximately 45 seconds until water stops filling chamber.

CHAMBER IS BEGINNING TO GET HOT.

5. Press Controls "OFF" then "ON" .
6. Open door.
7. Water should be approximately 2 inches from the front of the chamber opening.

WARNING

Disconnect power cord from power source before removing panels or servicing internal component to prevent electrical shock.

AUDIBLE SIGNAL VOLUME CONTROL ADJUSTMENT

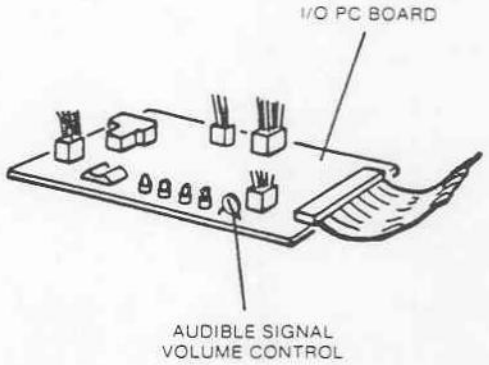
A control device is provided to adjust the loudness of the "beep" that is heard when a selector switch is pressed for a cycle is completed. The control is a disc shaped potentiometer located on the outer edge of the Input/Output PC Board.

1. To adjust, remove the left side panel of the sterilizer cabinet.
2. Turn the control clockwise to lower the "beep" sound and counterclockwise to increase the volume.

NOTE

Turn Main Switch ON and press the Controls ON and OFF switch to make the "beeper" sound.

3. Hold the side panel in place against the unit when checking the sound level.

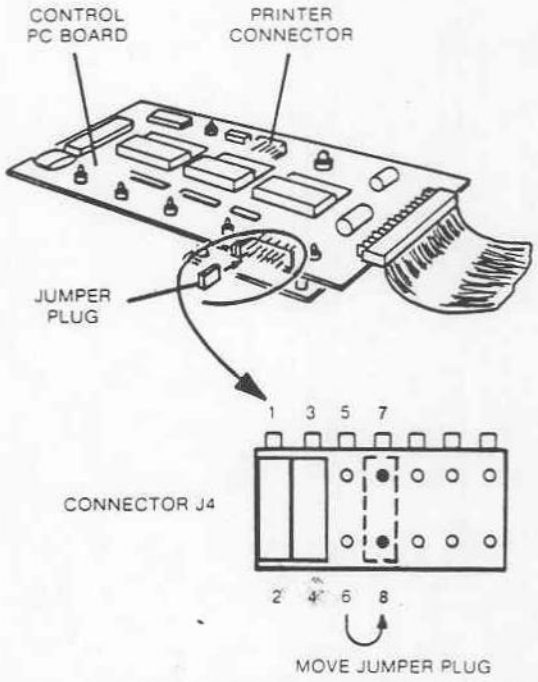


CONVERTING FROM CELSIUS TO FAHRENHEIT.

Conversion from celsius to fahrenheit readout requires moving a jumper plug on the Control PC board. To gain access to the jumper plug the Control PC board must be removed from the underside of the top cover. (See "Control Printed Circuit Board Removal on page 5-2).

Slide the jumper plug off pins 5 & 6 and move it to pins 7 & 8 on connector J4 located on the Control PC board.

Replace the Control Board in the unit. Do not forget to connect the three ribbon cable connectors from the Data Logger printer, Selector/Indicator panel and the I/O PC Board.



Disconnect power cord from power source before removing panels or servicing internal component to prevent electrial shock.

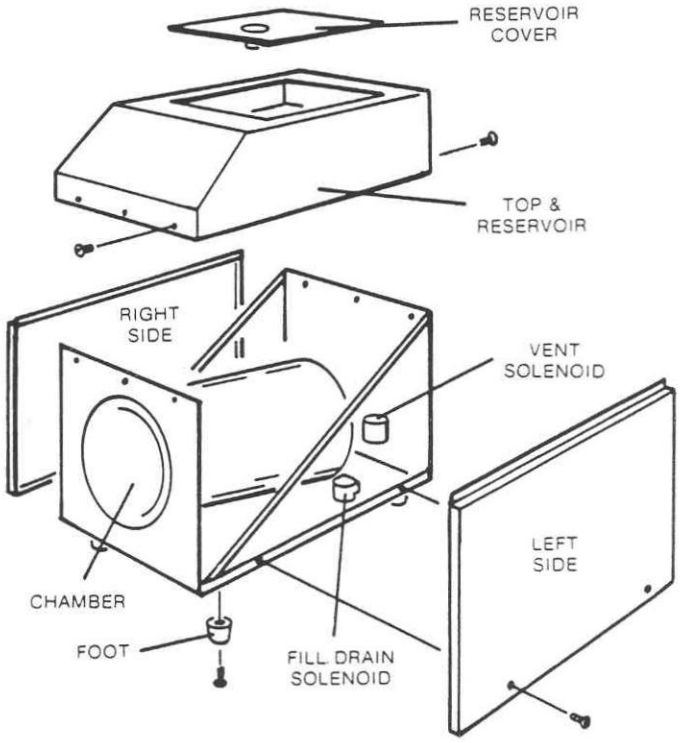
CABINET REMOVAL

Sides:

1. Remove two screws at the lower edge of the side panel.
2. Pull the panel down and outward at the bottom until upper edge disengages from the top cover.

Top Cover and Reservoir Assembly

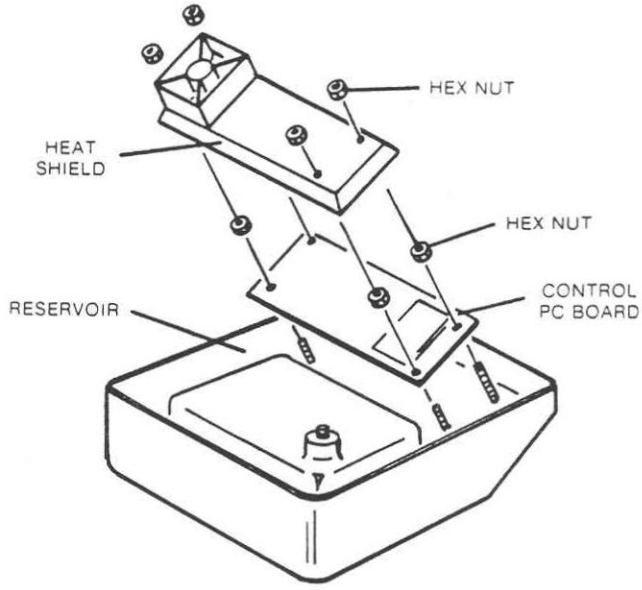
1. Remove reservoir cover.
2. Remove paper roll to prevent dropping if top is tipped.
3. Drain Reservoir.
4. Disconnect the tubings from the Fill and Vent Solenoid valves.
5. Unplug the ribbon wiring connector from the Input/Output printed circuit board in the base of the sterilizer.
6. Disconnect the connector on the cooling fan wires.
7. Remove three (3) screws at the front and three (3) screws at the back of the top cover and lift the top from the sterilizer.



CABINET ASSEMBLY

CONTROL PC BOARD

1. Remove the top cover and reservoir from the sterilizer as described above.
2. Remove the four hex nuts and the cooling fan and shield assembly from the inside of the top cover.
3. Disconnect the ribbon wires from the Data Logger Printer, at the Control Panel PC Board if the unit is equipped with a Data Logger. Note the relation of the connector key to the jack.
4. Disassemble the hex nuts from the four mounting studs and carefully lift the PC Board off the mounting studs far enough to disconnect the Selector/Indicator Ribbon connector from the PC Board.
5. Check PC Board calibration before assembling replacement board in the top.
   a). Connect ribbon cable from I/O PC Board to Control PC Board.



REMOVING CONTROL PC BOARD

WARNING

Disconnect power cord from power source before removing panels or servicing internal component to prevent electrical shock.

b). Check reference voltage of 2.500 ±.001 volts with test probes on terminals 13 & 14 at connector J4.

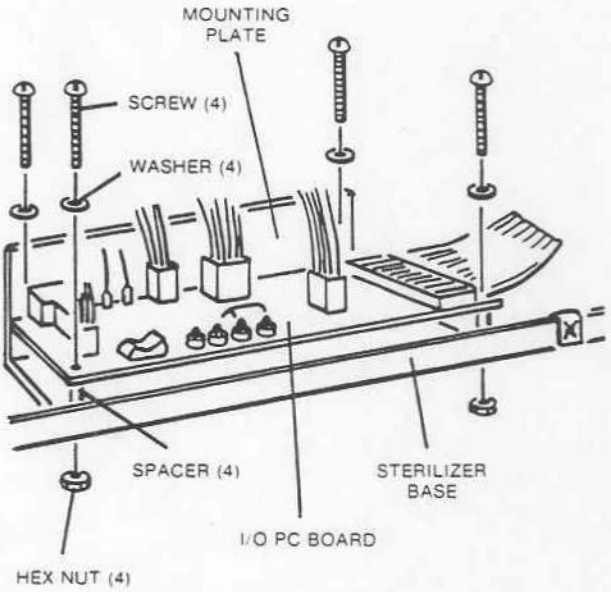
c). Adjust R17 on Control PC Board to obtain the required voltage.

NOTE ▶

When replacing PC Board be sure all connector plugs are attached and the LEDs on the PC Board are aligned with the round openings in the Control Panel.

INPUT/OUTPUT PC BOARD

1. Disconnect power cord from the power source.
2. Remove the left side panel from the sterilizer cabinet.
3. Note the location of the wires on the board and disconnect all electrical wires and harness connectors from the I/O PC Board.
4. Remove the four hex nuts from the underside of the sterilizer base and lift the PC Board and mounting plate assembly out.
5. The PC Board is attached to the mounting plate with four screws, washers, and spacer. Note the position of the board on the mounting plate. Remove the four screws, washers, and spacers and separate the PC Board from the mounting plate.
6. Attach the replacement I/O PC Board to the mounting plate and install the assembly in the sterilizer cabinet.
7. Connect the five connector plugs and the four separate wire connections. Refer to wiring diagram.
8. At completion of installation, but before replacing side panel, adjust the audio signal volume to the desired level of the customer (as described on page 5-1).



REPLACING INPUT/OUTPUT PC BOARD

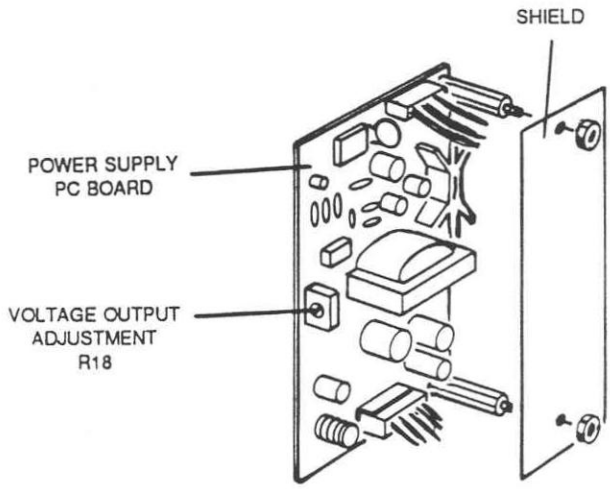
Disconnect power cord from power source before removing panels or servicing internal component to prevent electrical shock.

POWER SUPPLY PC BOARD

1. Disconnect the Power Cord from the power source.
2. Remove the left side panel from the sterilizer.
3. Disconnect the wire harness plugs and remove the hex nuts retaining the circuit board and the shield to the back of the sterilizer.
4. Install the replacement circuit board in the reverse order of removal. Be sure the protective shield is in place.
5. Connect the wire harness connectors.
6. Connect the power cord to the power source and press the Main Switch on the back of the unit to ON.
7. Check Power Supply output voltage.
   a) Connect unit to power source.
   b) Set voltmeter for 20 VDC range and check voltages at designated pins in connector J9 on the I/O PC Board as shown below.

PIN NO.	MIN. VOLTAGE
5 & 1	12 VDC
5 & 2	5 VDC
5 & 3	5 VDC
5 & 4	0 Volts

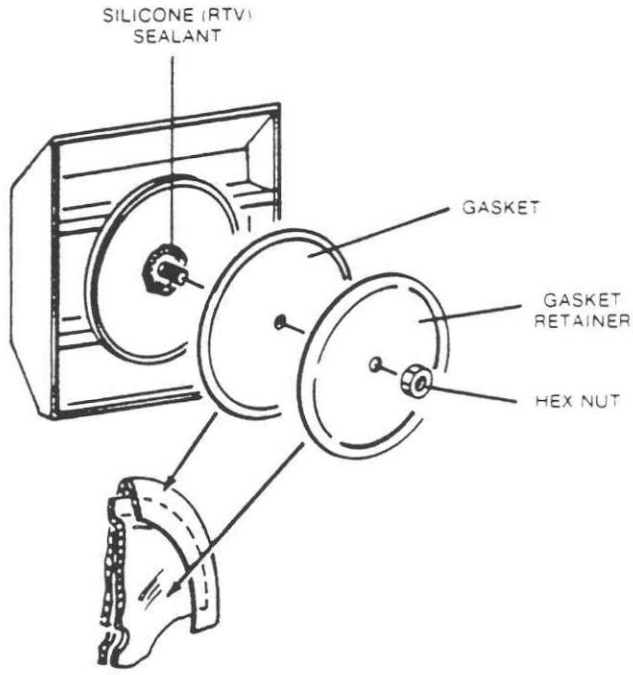
   c) Adjust pins 5 & 2 with test probes at R18 to obtain +5.00 VDC ± .005.



POWER SUPPLY OUTPUT ADJUSTMENT

DOOR GASKET

1. Remove the hex nut in the center of the Gasket Retainer and remove the gasket and gasket retainer. Note, gasket will be adhered to door plate.
2. Clean surface of the door plate, new gasket, and gasket retainer of any dirt, adhesives or deposits.
3. Apply a generous amount of silicone sealant in a 2" diameter area around the center fitting on the door plate.
4. Assemble the Gasket Retainer (formed lip toward gasket) and Gasket with narrow flap on gasket over lip on retainer.



DOOR GASKET REPLACEMENT

DOOR GASKET (Continued)

5. Place the gasket and retainer assembly on the center fitting of the door plate as shown and secure with hex nut, finger tight (firm). Do not use wrench.
6. Push the assembled part onto the center fitting (gasket against door plate).
7. Replace the hex nut and tighten finger tight (firm). Do not use wrench.
8. Allow an hour or so for the silicone sealant to set, then run a sterilize cycle (no load) to seat the new gasket.

DOOR HANDLE AND LATCH

1. Open the door and remove the two screws from the Latch Bracket.

To remove the Latch Bracket it will be necessary to remove the door cover.

DOOR COVER

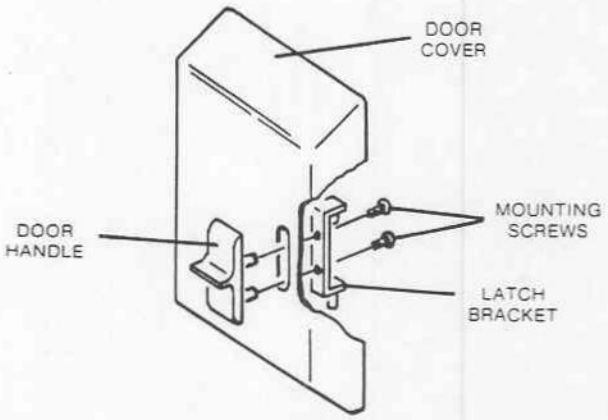
1. Remove the door handle as described in Door Handle and Latch Removal.
2. Remove the hex nut in the center of the door gasket retainer and remove the GASKET RETAINER ONLY.

NOTE ▶ *The gasket is adhered to the door plate, DO NOT REMOVE GASKET.*

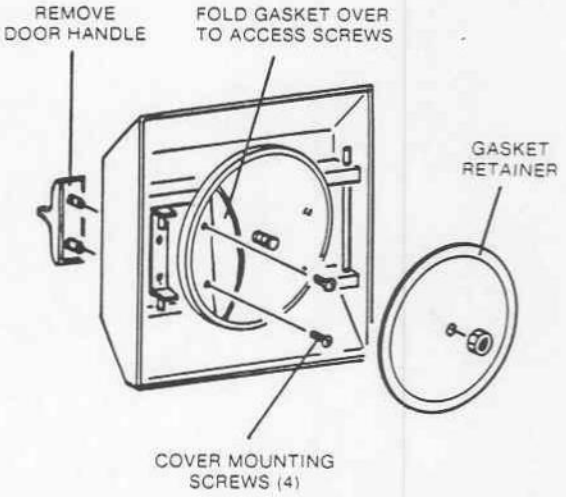
3. Carefully fold sides of gasket back to expose two mounting screws on each side of door plate. Removing the four mounting screws will dismount the outer door cover.

PRESSURE GAUGE

1. Remove Door Handle and Cover from the door as described in this manual.
2. Remove Pressure Gauge from the fitting in the center of the door.
3. Apply pipe thread sealant to the threads on the new gauge and install in fitting. Be sure gauge is aligned properly.
4. Reassemble the outer door cover, handle and gasket retainer.



DOOR HANDLE REPLACEMENT

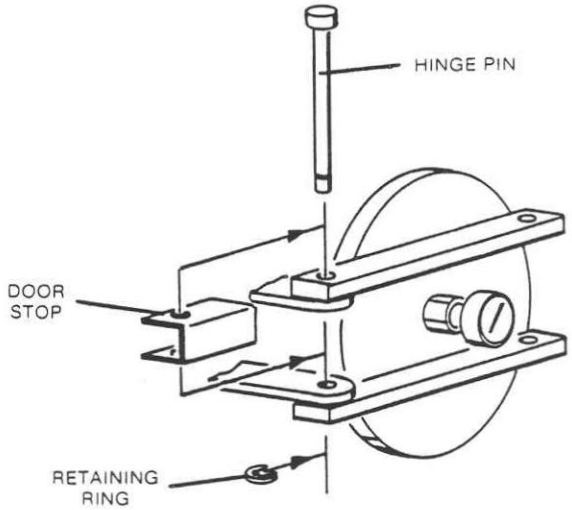


OUTER DOOR COVER REPLACEMENT

Disconnect power cord from power source before removing panels or servicing internal component to prevent electrical shock.

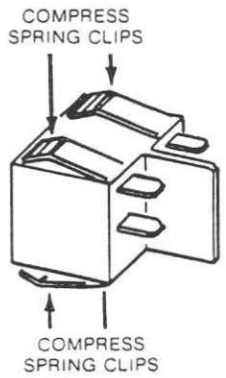
COMPLETE CLOSURE (DOOR)

1. Remove the Door Handle and Door Cover as described in this manual.
2. Remove the snap ring from the bottom on the door hinge pin.
3. Slide the hinge pin upward to disengage from the door stop bracket and mounting brackets.



MAIN POWER ON-OFF SWITCH

1. Remove left side panel from sterilizer.
2. Disconnect wires from switch.
3. Compress the spring clips at the top and bottom of the switch and remove the switch from the outside of the back panel.



REMOVING MAIN SWITCH

VOLTAGE SELECTOR SWITCH

1. Remove access cover from the back of the sterilizer.
2. Remove the two screws securing the switch to the sterilizer cabinet.
3. Pull the switch with wires attached as far out the opening as possible without damaging the wire terminals.
4. Orient the replacement switch in the same position as the old switch and transfer each wire to the same terminal on the new switch.
5. Remount the new switch in place in the cabinet with the screws previously removed.
6. Replace the access opening cover.

WARNING

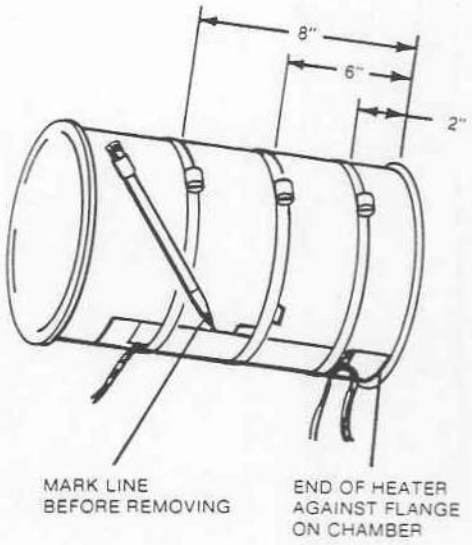
Disconnect power cord from power source before removing panels or servicing internal component to prevent electrical shock.

HEATER REPLACEMENT (Dual Voltage)

1. Remove the side panels from the sterilizer.
2. Loosen the retainers and remove the insulation from the heater area.

IMPORTANT

Before removing any part of the heater or overheat cut-off switch bracket, mark a pencil outline around the heater, straps and the overheat cut-off bracket. It is important to replace these components in the same locations. Misalignment could cause an overheat malfunction.

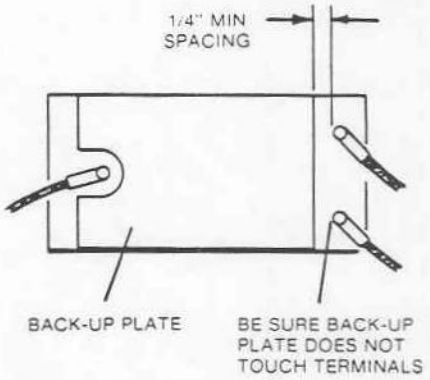


HEATER REPLACEMENT
(DUAL VOLTAGE)

3. Note wire location and disconnect the electrical leads at the I/O printed circuit board and voltage selector switch.
4. For convenience, disconnect the wires from the overheat cut-off switch.
5. Remove the bands and remove the heater, back up plate and overheat cut-off assembly.

INSTALLATION

6. Place the back up plate against the terminal side of the heater with single terminal located in the cut out.
7. Center the heater and back up plate on the underside of the chamber. (Two terminal end of the heater against the flange at the closed end of the chamber).
8. Position the three retaining straps around the chamber and heater assembly. Do not tighten.
9. Slide the end of the overheat cut-off bracket between the heater and chamber (centered on the left side of the unit).
10. Align the retaining straps, overheat cut-off bracket and heater assembly exactly on the marked outlines made when old assembly was removed. Center strap is over overheat bracket. Tighten straps securely.



BACK-UP PLATE PLACEMENT
ON HEATER

CAUTION

Be sure the Back Up Plate is not touching the electrical terminals on the heater at either end.

NOTE

It is normal for replacement heaters to smoke slightly for first few cycles.

WARNING

Disconnect power cord from power source before removing panels or servicing internal component to prevent electrical shock.

OVERHEAT (LOW WATER) CUT-OFF SWITCH

The overheat cut-off switch is attached to the mounting bracket with two screws, washers, and hex nuts. Note that the switch is attached to upper of the two mounting tabs on the bracket. The replacement switch must be attached to the same mounting tab from which the old switch was removed.

NOTE

If mounting bracket is to be removed, be sure to mark a pencil outline of the bracket on the chamber before removing the bracket.

SOLENOID VALVE CLEANING & REPAIR

CAUTION

Water in reservoir and piping may be HOT. Care should be taken to prevent burns.

Remove the side panels from the sterilizer.

Electrical Coil Test

An audible "click" can be heard when a solenoid coil is energized.

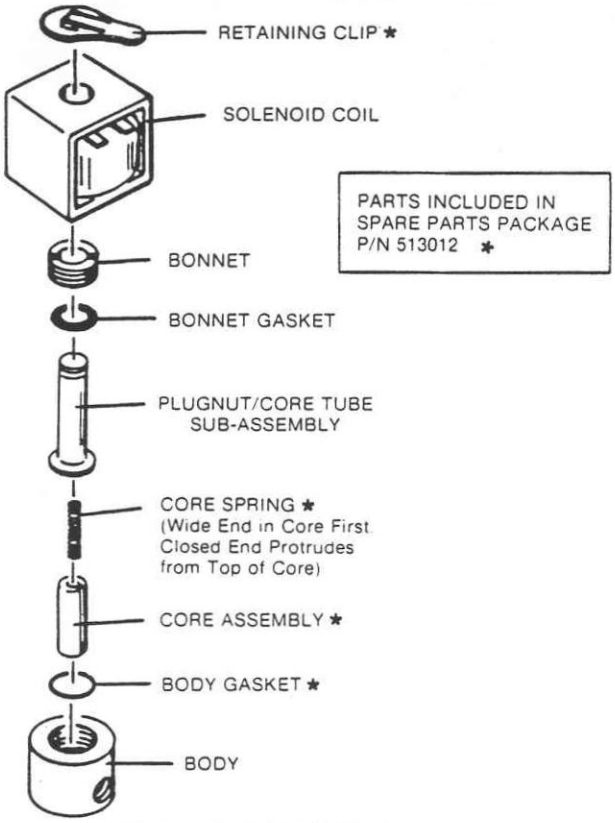
- Pressing Controls "ON" energizes the vent solenoid.
- Pressing "Cycle Start" energizes the FILL/DRAIN solenoid.

— OR —

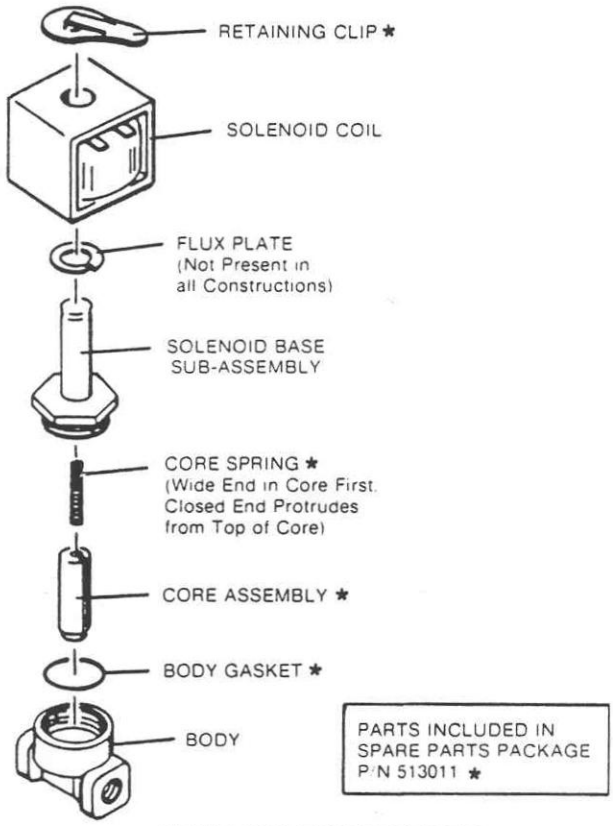
Place the flat side of a small screwdriver blade on the top/center of the coil. A magnetic attraction, while coil is energized, indicate coil operation.

Electrical Coil Removal

1. Using a small screwdriver carefully raise the spring tab on the center of the retaining clip and slide the clip off the top of the sleeve.
2. Lift the Rating plate and Coil from the sleeve. (Disconnect wire leads if coil is to be replaced).
3. Reassemble in reverse order of disassembly.



FILL/DRAIN SOLENOID VALVE


RETAINING CLIP *
SOLENOID COIL
FLUX PLATE
(Not Present in all Constructions)
SOLENOID BASE SUB-ASSEMBLY
CORE SPRING *
(Wide End in Core First. Closed End Protrudes from Top of Core)
CORE ASSEMBLY *
BODY GASKET *
BODY
PARTS INCLUDED IN SPARE PARTS PACKAGE P/N 513011 *

VENT SOLENOID VALVE

WARNING

Disconnect power cord source before removing panels or servicing internal component to prevent electrical shock.

Valve Disassembly

5. VENT VALVE — Unscrew the sleeve from the body with an open end wrench on the hex portion. Hold the body portion with second wrench to prevent damage to piping.

   FILL/DRAIN VALVE — A spanner wrench is required to remove the bonnet which secures the sleeve to the valve body.

6. Remove the Core, Core Spring, and Body Gasket.
7. Clean and inspect parts and valve seat. If valve seat in the body is damaged, the entire valve must be replaced.
8. When installing a service package, replace all parts supplied in the service package.

   NOTE: Tapered end of core spring upward.

9. Reassemble in reverse order of disassembly.

PRESSURE RELIEF VALVE

Removal

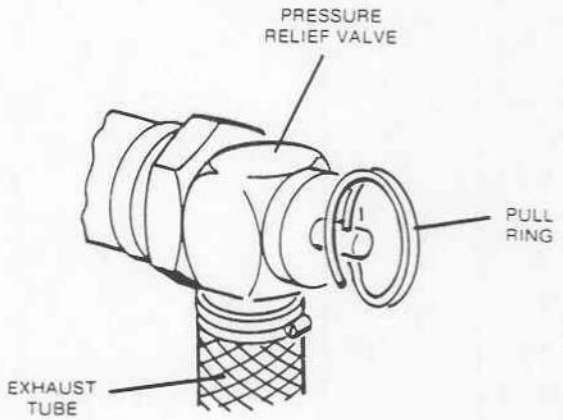
1. Drain the water from the reservoir and remove access panel on back of cabinet.
2. Remove the extension tubing from the exhaust port of the valve. It may be necessary to tip the unit to access the tube.
3. Hold the cross fitting with pipe wrench to prevent damage to chamber fitting. Remove valve from cross fitting.

Replacement

NOTE

Before installing the new valve, position the pull ring as shown in the illustration. This is to allow the pull ring to be accessed for testing through the hole in the cabinet.

4. Use a pipe sealant to ensure a leak free connection and install valve in cross fitting.
5. Reattach extension tube and access panel.



POSITIONING PULL RING ON
PRESSURE RELIEF VALVE

Disconnect the power cord from power source before removing panels or servicing internal component to prevent elecirical shock.

TEMPERATURE PROBE

Test

A voltage reading taken at the I/O PC board compared to the temperature (°Centigrade) on the display panel will indicate proper temperature probe functioning.

To test, place voltmeter test probes on terminals 2 & 3 of connector J7 on the I/O PC board.

Proper temperature probe operation should indicate a voltage reading of 10 millivolts per degree centigrade showing on display panel. Example, if display is showing 90°C, voltage reading should be 900 millivolts.

Removal

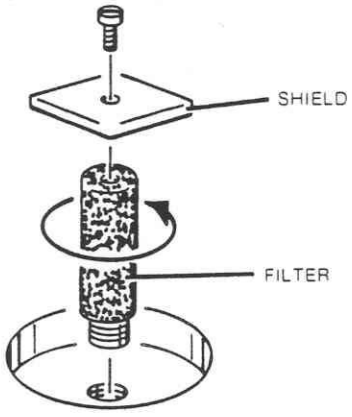
1. Remove right side panel and access panel from back of cabinet.
2. Disconnect electrical wire at input/output printed circuit board.
3. Unscrew the probe assembly from the cross fitting.

Replacement

4. Apply pipe thread sealant and install replacement probe assembly.
5. Connect electrical wire connector to I/O PC board and replace panels.

RESERVOIR FILTER

1. Remove reservoir cover.
2. Turn filter counterclockwise to remove.
3. Remove shield from top of filter and transfer to replacement filter.



REMOVING RESERVOIR FILTER

WARNING

Disconnect the power cord from power source before removing panels or servicing internal component to prevent electrical shock.

DATA LOGGER PRINTER (GLS-10 Units)

Removal

1. Remove the Printer door and hinge pin from the top assembly.

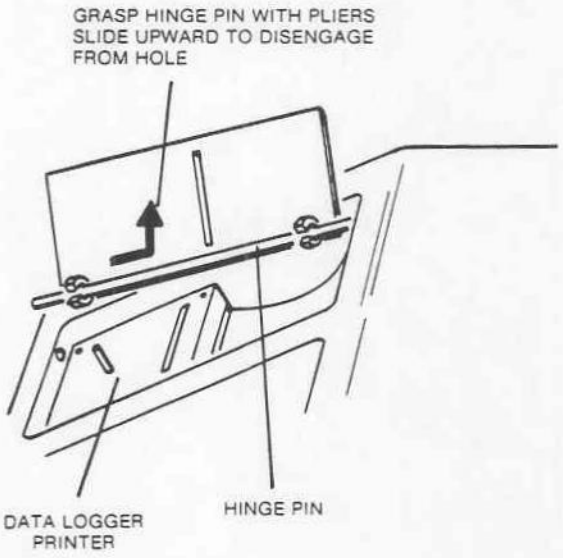
   Grasp the hinge pin with pliers; with a pushing and twisting motion slide the hinge pin upward to disengage the bottom end of the pin. Then slide the pin and door out of the upper hole.

2. Lift the printer assembly straight upward. The screws in the corners of the printer are not fastened into the top cover.

   Raise the printer enough to pull the ribbon cable up through the opening beneath the printer. Disconnect the cable to remove the printer.

Replacement

3. Replace the printer in reverse order of removal. Reconnect ribbon cable connector.
4. To replace printer door, slide hinge pin out of door. Insert top end of pin in upper hole, slide pin downward to engage lower end of pin. Snap door onto pin.



REMOVING DATA LOGGER PRINTER HEAD DOOR

COOLING FAN

1. Disconnect Power Cord from power source.
2. Remove the top cover and reservoir as described on page 5-2 of this manual.
3. Remove the heat shield and fan assembly. (See page 5-2).
4. Replace the defective fan on the heat shield and remount the shield to the reservoir assembly.

NOTE

Be sure to connect all wire and plumbing connections.

5. Reassemble the reservoir and panels.

CONDITIONAL INSTRUCTIONS

EMERGENCY OFF (Cycle Abort)

PRESSING THE CONTROLS OFF ⏻ SWITCH WILL TURN THE STERILIZER OFF.

LIQUID LOADS: To prevent boil over of liquids in chamber; allow sterilizer to cool down slowly until the pressure gauge is at zero.

Non-Liquid Load — pressing the Controls ON ⏻ immediately after the Controls OFF has been pressed will vent steam and water from the chamber back into the reservoir.

DO NOT ATTEMPT TO OPEN THE STERILIZER DOOR until the pressure gauge in the center of the door reads zero (0). Pressure within the chamber could cause the door to open with extreme force causing possible personnel injury.

Re-process goods to achieve sterility when sterilizing cycle has been terminated prematurely. Failure to do so may result in non-sterile goods.

OVERHEAT LOW WATER CUT-OFF

If there is an insufficient amount of water in the reservoir to properly fill the chamber, the chamber will overheat causing a premature abort of the cycle. The letters (OH) will appear on the Selector/Indicator Panel display and the word "OVERHEAT" will print out on the Data Logger tape on units equipped with a Data Logger.

When a new sterilizer is put into service or the reservoir has been drained or has run dry and refilled, the first cycle may go into "OVERHEAT" because of a low water condition caused by an air-lock in the piping. See "INITIAL START UP PROCEDURE" located on page 8 of the Operators Manual (350123).

To Restore Operation:

a. Press the OFF ⏻ button.

b. Be sure the pressure gauge is reading zero and open the chamber door.

Do not put water in hot chamber. This could cause a flash generation of steam resulting in burns to personnel.

c. Wait for the chamber to cool (approximately 10-15 minutes).

d. Check the water level in the reservoir (add distilled or deionized water only to FILL mark if necessary).

e. Press Control ON ⏻ Switch.

- If OH does NOT reappear in the display on the Selector/Indicator Panel, close the door and proceed as normal.
- If OH does reappear in the display on the Selector/Indicator Panel, press Controls OFF and wait an additional time period and press ON again.

If the OH indicator does not go out after several attempts and chamber has cooled considerably, call for service maintenance.

Re-process goods to achieve sterility when sterilizing cycle has been terminated prematurely. Failure to do so may result in non-sterile goods.

ERRATIC CONTROLS DISPLAY OR OPERATION

Abnormal sterilizer operation or controls display could be caused by an internal or external electrical voltage surge. A voltage surge could be initiated by a momentary electrical surge in the power supply, a nearby lightning storm, or even a static electrical charge from someone walking across a carpet and touching the sterilizer.

This is not a common occurrence and may never happen, and no damage will happen to the equipment if it should occur.

If an abnormal condition should occur the processing cycle in progress must be aborted. (Press the "OFF" selector on the Selector/Indicator Panel.)

To realign the microcomputer to resume normal operation, turn the main switch, on the back of the sterilizer cabinet, to OFF. Wait 30 seconds and turn the main switch ON again. The microcomputer is now ready to turn on at the Selector/Indicator Panel and the sterilizing parameter reset. Proceed with normal operation.

POWER FAILURE DURING STERILIZING CYCLE

(All Selector/Indicator panel lights will be off)

LIQUID LOAD: To prevent boil over, allow unit to cool down until pressure gauge is at zero. When pressure reads zero, press "ON" then "LIQUID LOAD" and cycle start to reprocess the load.

NON-LIQUID LOAD: Press "ON" switch, reset parameters and press "CYCLE START" to re-process the load.

OPERATORS MAINTENANCE

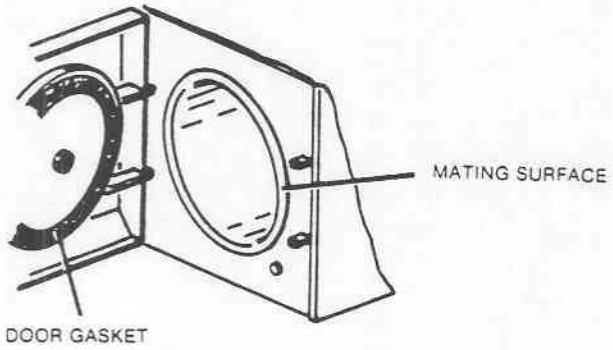
DAILY

WARNING

Prevent the possibility of burns. Be sure sterilizer is cool when cleaning door gasket and mating surface. It is a good practice to clean the gasket and surface before each day's use.

CLEANING DOOR GASKET

The door gasket and the mating surface should be wiped clean each day with a clean damp cloth. Do not use abrasive cleaners on the gasket or mating surface.



The gasket should be examined for cracks or possible damage that could result in a poor pressure seal. If replacement is necessary, refer to the WHEN REQUIRED maintenance section of this manual.

WEEKLY

(More often if necessary)

CLEANING CHAMBER, TRAYS AND RACK

WARNING

Prevent the possibility of burns. Be sure sterilizer is completely cool before cleaning chamber surfaces and components.

CAUTION

Failure to keep the interior of the stainless steel chamber free from mineral deposits or other debris can cause serious deterioration and premature failure of the chamber.

At least once a week the trays and tray rack should be removed from the sterilizer chamber. The trays, tray rack and chamber should be thoroughly cleaned to remove any deposits from the surfaces.

CAUTION

Never use a wire brush, steel wool, abrasives or chloride containing cleaning agents. These materials will damage the metal surfaces of the chamber and components.

Clean the trays, tray rack and inside of the chamber (especially the bottom of chamber) with Castle "Schedule 7" Chamber Cleaner.

Wipe all residue from the surfaces with a dampened lint-free cloth.

CLEANING CHAMBER FILTER SCREEN

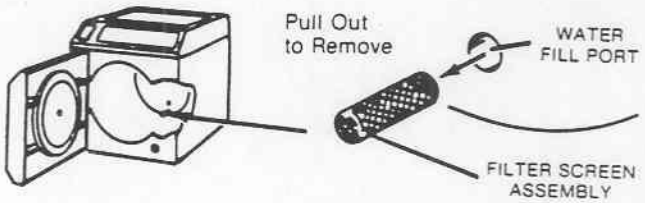
WARNING

Prevent the possibility of burns. Be sure sterilizer is completely cool before servicing.

1. Pull the filter screen out of the water fill port, inside the chamber.
2. Clean any deposits from the screen using a small stiff-bristled brush or an Ultrasonic Cleaner.
3. When clean, push the open end of the filter screen into the water fill port in the back of the chamber.

CAUTION

Operating the sterilizer without the filter screen in place could prematurely clog the filter in the reservoir.



MONTHLY

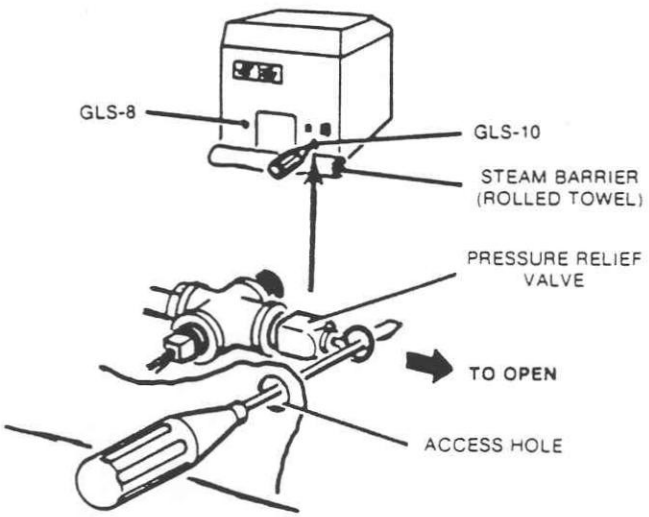
PRESSURE RELIEF VALVE CHECK

The pressure relief valve must be checked each month by a qualified person to be sure the valve is functioning properly.

The pressure relief valve is located inside the cabinet, behind the chamber. A round access hole is provided in the back panel, through which a rod (screwdriver) can be inserted to test the pressure valve.

Steam blow-off will be discharged from under the rear of the sterilizer when the ring on the relief valve is pulled. To prevent possible burns to operator, place a steam barrier (rolled towel) around the bottom of the sterilizer.

1. Run a sterilize cycle with no load in the chamber at 135°C (275°F).



2. When pressure gauge reaches 30 psi (206 kPa), insert the rod through the access hole in the back panel into the ring on the pressure relief valve. Pull the valve ring to open for approximately 3 seconds. Steam should freely discharge from beneath the rear of the unit.
3. Release the ring and the steam discharge should terminate completely.
4. If valve malfunctions, the valve must be replaced.
5. Turn the unit off after valve check to prevent overheating.

If traces of steam continue to escape through the valve, the valve has not reseated properly. Open and close the valve quickly (several times if necessary) by pulling the ring and letting it snap closed.

CLEANING RESERVOIR

Prevent the possibility of burns. Be sure sterilizer is completely cool before cleaning reservoir. The water in the reservoir could be HOT if sterilizer was in use just prior to cleaning reservoir.

Draining the Reservoir

1. The reservoir drain tube is located at the lower right of the chamber opening on the front of the sterilizer. Pull the drain tube outward, unscrew the cap from the drain tube and drain the contents of the reservoir into a container.
2. Replace the cap and push the drain tube back into the front plate.
3. Lift top cover from the sterilizer.
4. Wipe the reservoir out with a clean damp, lint-free cloth, to remove any deposits. DO NOT use abrasive cleaners.
5. Clean the reservoir filter as described below.
6. Replace the reservoir cover and refill the reservoir with distilled water.

Cleaning Reservoir Filter

The filter in the reservoir should be cleaned each time the reservoir is cleaned to guard against an overheat situation due to insufficient water to the chamber.

To clean the filter, unscrew the filter from its fitting and rinse thoroughly with clean water. A stiff bristled brush is helpful to remove "stuck on" debris. For stubborn, embedded debris, the "back-flush" method is often effective.

To "back-flush" filter:

1. With reservoir empty, replace the reservoir cover.
2. Manually fill sterilizer chamber with 350cc (12 oz.) of distilled water (until water is 1" from front edge of chamber).

3. Run sterilizer through normal sterilization cycle. When cycle vents back into the reservoir through the filter, the clogged debris will be dislodged and blow into the reservoir.
4. Wipe the inside of the reservoir clean, refill with clean distilled water to return the sterilizer to operation.

If none of the above cleaning methods works to effectively clean the filter, replacement may be necessary.

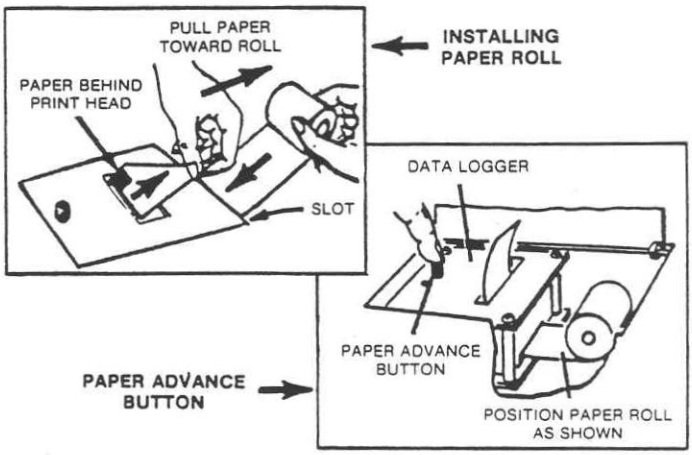
WHEN REQUIRED

Paper Roll Installation

The paper roll must be positioned and fed into the Data Logger printer as shown. The paper is sensitized for printing on one side only.

1. Cut the lead end of the paper to a long taper as shown in illustration. The point of the cut should be on the side of the paper as shown.

2. Feed the cut end of the paper into the slot at the bottom of Data Logger printer and push the paper through until the tip comes out the top of the printer.
3. While holding the roll in one hand so the paper stays taut, grasp the tip of the paper with the other hand and pull it through until the full width of the paper is under the printer head.
4. Pull enough paper through to be inserted through the slot in the cover and place the roll in the paper roll well.



5. Feed the paper through the cover and close the cover.

NOTE

At the end of each day's use, the printed portion of Data Logger tape should be removed and placed in a black plastic storage bag and sealed with the label containing the date. The Paper Advance Button is provided to manually advance paper through the Data Logger printer.